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MATFIELD IMPOUNDMENT, PLYMOUTH COUNTY, MASSACHUSETTS, EPA REGION I.

Pacific Northwest Environmental Research Laboratory

Prepared for:

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April 1975

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT

ON

MATFIELD IMPOUNDMENT

PLYMOUTH COUNTY

MASSACHUSETTS

EPA REGION I

WORKING PAPER No. 221

WITH THE COOPERATION OF THE

MASSACHUSETTS DIVISION OF WATER POLLUTION CONTROL

AND THE

MASSACHUSETTS NATIONAL GUARD

APRIL, 1975

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Massachusetts Division of Water Pollution Control for professional involvement and to the Massachusetts National Guard for conducting the tributary sampling phase of the Survey.

Thomas C. McMahon, Director, John R. Elwood, Supervisory Sanitary Engineer, Eben Chesebrough, Senior Chemist, and Peter A. Tennant, Senior Sanitary Engineer of the Massachusetts Division of Water Pollution Control provided invaluable lake documentation and counsel during the course of the Survey.

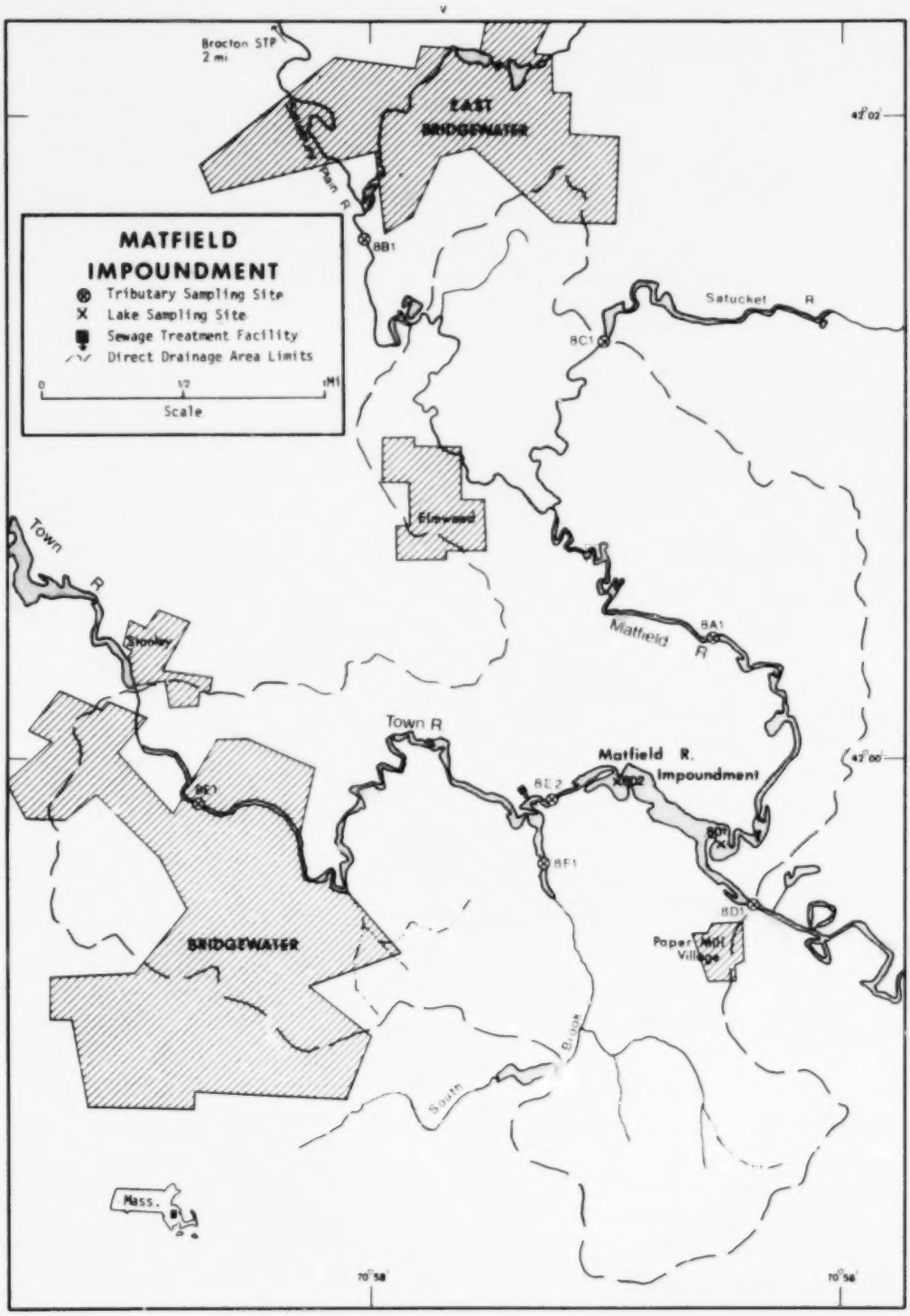
Major General Vahan Vartanian, the Adjutant General of Massachusetts, and Project Officer Major William Flaherty, who directed the volunteer efforts of the Massachusetts National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF MASSACHUSETTS

LAKE NAME	COUNTY
Assabet-Concord River Impoundments	
Northboro	Worcester
Hudson	Middlesex
Maynard	Middlesex
Billerica	Middlesex
Hager Pond	Middlesex
Matfield Impoundment	Plymouth
Rochdale Pond	Worcester
Woods Pond	Berkshire


MATFIELD
IMPOUNDMENT
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Direct Drainage Area Limits
0
1/2
1MI
Scale
Brockton STP
2 mi
EAST
BRIDGEWATER
Salisbury Plain R
BB1
Satucket R
BC1
Elmwood
Town R
Stanley
Matfield R
BA1
Town R
Matfield R.
Impoundment
BE2
BE1
BD1
Paper Mill Village
BRIDGEWATER
South R
Mass.
42°02'
42°00'
70°58'
70°58'

MATFIELD IMPOUNDMENT

STORET NO. 2508

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Matfield Impoundment is highly eutrophic. When the 205 Survey lakes on which sampling was completed in 1972 were arranged from best to worst trophic condition on the basis of six biological, chemical, and physical parameters, Matfield Impoundment ranked as extremely eutrophic. Algal data lend support to this classification; blue-green algae were abundant during the August sampling period.

B. Rate-Limiting Nutrient:

Algal assays indicate that Matfield Impoundment was nitrogen limited at the time the sample was collected (10/08/72). The lake data indicate nitrogen limitation at the other sampling times as well.

C. Nutrient Controllability:

1. Point sources--During the sampling year, Matfield Impoundment received a total phosphorus load at a rate more than 100 times that proposed by Vollenweider (in press) as "dangerous"; i.e., a eutrophic rate (see page 13). Now, Vollenweider's model probably does not apply to water bodies

with short hydraulic retention times, and the mean hydraulic retention time of Matfield Impoundment is a very short six hours. Nonetheless, the existing trophic condition of the reservoir is evidence of excessive nutrient loads.

It is calculated that the cities of Brockton and Bridgewater collectively contributed nearly 65% of the total phosphorus load to the reservoir during the sampling year. However, even complete removal of phosphorus at these two sources would still leave a loading rate in excess of 2,500 lbs P/acre/year (289 $g/m^2/yr$); and, regardless of the applicability of Vollenweider's model, it is not likely that phosphorus control at the two known point sources would result in substantial improvement in the trophic condition of the reservoir unless other sources of phosphorus can be controlled as well (see below).

It is noted that the Matfield River basin plan of the Massachusetts Division of Water Pollution Control includes a regional wastewater treatment plant to be located below Matfield Impoundment which will treat the wastes from Bridgewater and thus eliminate the phosphorus load to the reservoir from that source (Chesebrough, 1975).

2. Non-point sources--During the sampling year, the phosphorus export rate of the Matfield River was a very high 1,040 lbs/mi^2 (see page 12). This export rate was over four times that of the Satucket River and over three times that of the Town River; it appears likely that unidentified point sources contributed significantly to the phosphorus export of the Matfield River.

Until a more-detailed study of the unknown phosphorus sources is completed and controllability is known, the effectiveness of point-source phosphorus control cannot be evaluated. However, because of the very high drainage area to reservoir area ratio of 2,295 to 1, it appears that a substantial degree of control of phosphorus from all sources will be needed to appreciably improve the trophic condition of the reservoir. Note that the non-point phosphorus contribution of the Satucket River alone would result in an impoundment phosphorus loading of 208 lbs/acre/yr or over 23 g/m^2/yr.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

A. Lake Morphometry:

1. Surface area: 38 acres.
2. Mean depth: 3 feet.
3. Maximum depth: 7 feet.
4. Volume: 114 acre-feet.
5. Mean hydraulic retention time: 6 hours.

B. Tributary and Outlet:
(See Appendix A.for flow data)

1. Tributaries -

Name	Drainage area†	Mean flow†
Matfield River	76.4 mi^2	133.0 cfs
(Salisbury Plain River	38.6 mi^2	67.1 cfs)*
(Satucket River	34.9 mi^2	60.7 cfs)*
Town River	60.2 mi^2	104.7 cfs
Minor tributaries & immediate drainage -	1.1 mi^2	2.1 cfs
Totals	137.7 mi^2	239.8 cfs

2. Outlet -

Taunton River	137.8 mi^2**	239.8 cfs

C. Precipitation***:

1. Year of sampling: 61.22 inches.
2. Mean annual: 44.57 inches.

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† Drainage areas are accurate within ±1%; gaged mean daily, monthly, and normalized monthly flows are accurate within ±15%; and ungaged mean daily, monthly, and normalized flows are accurate within ±20%.
* Included in Matfield River drainage area and flow.
** Includes area of lake.
*** See Working Paper No. 1, "Survey Methods, 1972".

III. LAKE WATER QUALITY SUMMARY

Matfield Impoundment was sampled three times during the open-water season of 1972 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from two stations on the lake and from one or two depths at each station (see map, page v). During the last two visits, a single depth-integrated (near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the last visit, a single five-gallon depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depth sampled at each station was three feet.

The results obtained are presented in full in Appendix B, and the data for the fall sampling period, when the lake essentially was well-mixed, are summarized below. Note, however, the Secchi disc summary is based on all values.

For differences in the various parameters at the other sampling times, refer to Appendix B.

A. Physical and chemical characteristics:

FALL VALUES

(10/08/72)

Parameter	Minimum	Mean	Median	Maximum
Temperature (Cent.)	16.6	16.6	16.6	16.6
Dissolved oxygen (mg/l)	2.3	4.2	4.2	6.0
Conductivity (μmhos)	150	175	175	200
pH (units)	6.3	6.5	6.5	6.6
Alkalinity (mg/l)	<10	18	10	38
Total P (mg/l)	0.203	0.641	0.641	1.080
Dissolved P (mg/l)	0.108	0.429	0.429	0.750
NO_2 + NO_3 (mg/l)	0.350	0.395	0.395	0.440
Ammonia (mg/l)	0.420	2.640	2.640	4.860

ALL VALUES

Secchi disc (inches)	6	15	15	26

B. Biological characteristics:

1. Phytoplankton* -

Sampling Date	Dominant Genera	Number per ml
08/01/72	1. Anabaena	3,840
	2. Microcystis	2,500
	3. Dinobryon	1,159
	4. Flagellates	761
	5. Synedra	435
	Other genera	725
	Total	9,420
10/08/72	1. Flagellates	502
	2. Cryptomonas	141
	3. Navicula	90
	4. Nitzcshia	80
	5. Achnanthes	80
	Other genera	448
	Total	1,341

* Only two samples collected.

2. Chlorophyll a -
(Because of instrumentation problems during the 1972 sampling, the following values may be in error by plus or minus 20 percent.)

Sampling Date	Station Number	Chlorophyll a (µg/l)
06/04/72	01	2.1
	02	1.6
08/01/72	01	5.0
	02	2.4
10/08/72	01	1.3
	02	1.3

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.370	1.950	61.4
0.006 P	0.376	1.950	59.7
0.012 P	0.382	1.950	60.9
0.024 P	0.394	1.950	57.5
0.060 P	0.430	1.950	59.4
0.060 P + 10.0 N	0.430	11.950	286.5
10.0 N	0.370	11.950	259.1

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Matfield Impoundment was very high (only two lakes surveyed during 1972 had greater control yields). The algal assay indicated that the sample was nitrogen limited at the

time of analysis as addition of phosphorus alone did not produce a response, but nitrogen spikes increased the yield more than four-fold. These results are supported by field and laboratory data which revealed nitrogen/phosphorus ratios ranging from 4/1 to 8.5/1.

IV. NUTRIENT LOADINGS
(See Appendix C for data)

For the determination of nutrient loadings, the Massachusetts National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of March and April when two samples were collected. Sampling was begun in September, 1972, and was completed in July, 1973.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the New England District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. The tributary loads shown are those measured minus point sources, if any. However, note that the non-point nutrient loads given for the Town River include the unmeasured non-point loads of South Brook (see map, page v).

Nutrient loadings for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the nutrient loads, in lbs/mi^2/year, in the Satucket River at station C-1 and multiplying by the ZZ area in mi^2.

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* See Working Paper No. 1.

The operators of the Brockton and Bridgewater wastewater treatment plants provided monthly effluent samples and corresponding flow data.

A. Waste Sources:

1. Known muncipal -

Name	Pop. Served*	Treatment	Mean Flow (mgd)	Receiving Water
Bridgewater	4,500	trickling filter	0.495	Town River
Brockton	83,500	act. sludge	12.119	Salisbury Plain River

2. Industrial - Unknown

* Estimated.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	lbs P/ yr	% of total
a. Tributaries (non-point load) -		
Matfield River	79,470	28.7
(Satucket River	7,920)*	-
Town River	18,180	6.6
b. Minor tributaries & immediate drainage (non-point load) -	250	<0.1
c. Known municipal STP's -		
Bridgewater	13,850	5.0
Brockton	165,510	59.7
d. Septic tanks - Unknown	?	-
e. Industrial - Unknown	?	-
f. Direct precipitation** -	10	<0.1
Total	277,270	100.0

2. Outputs -

Lake outlet - Taunton River 181,380

3. Net annual P accumulation - 95,890 lbs.

* Included in Matfield River load at station A-1.
** See Working Paper No. 1.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	lbs N/yr	% of total
a. Tributaries (non-point load) -		
Matfield River	587,680	31.3
(Satucket River	274,930)*	-
Town River	497,060	26.5
b. Minor tributaries & immediate drainage (non-point load) -	8,670	0.5
c. Known municipal STP's -		
Bridgewater	39,120	2.1
Brockton	742,390	39.6
d. Septic tanks - Unknown	?	-
e. Industrial - Unknown	?	-
f. Direct precipitation**	370	<0.1
Total	1,875,290	100.0

2. Outputs -

Lake outlet - Taunton River 1,931,315

3. Net annual N loss - 56,025 lbs.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	lbs $P/mi^2/yr$	lbs $N/mi^2/yr$
Matfield River***	1,040	7,692
Satucket River	227	7,878
Town River	302	8,257

* Included in Matfield River load at station A-1.
** See Working Paper No. 1.
*** Includes Satucket River and Salisbury Plain River nutrient exports.

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (in press). Essentially, his "dangerous" rate is the rate at which the receiving water would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with very short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
Units	Total	Accumulated	Total	Accumulated
lbs/acre/yr	7,297.0	2,523	49,350	loss*
grams/m^2/yr	817.8	282.8	5,531	-

Vollenweider loading rates for phosphorus ($g/m^2/yr$) based on mean depth and mean hydraulic retention time of Matfield Impoundment:

"Dangerous" (eutrophic rate)	7.6
"Permissible" (oligotrophic rate)	3.8

* There was an apparent loss of nitrogen during the sampling year. This may have been due to insufficient sampling, nitrogen fixation in the reservoir, solubilization of previously sedimented nitrogen, recharge with nitrogen-rich ground water, or unknown and unsampled point sources discharging directly to the reservoir. Whatever the cause, a similar nitrogen loss has occurred at Shagawa Lake, Minnesota, which has been intensively studied by EPA's National Eutrophication and Lake Restoration Branch.

V. LITERATURE REVIEWED

Chesebrough, Eben W., 1975. Personal communication (Matfield River basin plan). MA Div. Water Poll. Contr., Westborough.

Vollenweider, Richard A. (in press). Input-output models. Schweiz. Z. Hydrol.

VI APPENDICES

APPENDIX A

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR MASSACHUSETTS 11/26/74

LAKE CODE 2508 MATFIELD RIVER IMPOUNDMENT

TOTAL DRAINAGE AREA OF LAKE 138.00

TRIBUTARY	SUB-DRAINAGE AREA	NORMALIZED FLOWS JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
2508A1	76.40	173.00	188.00	275.00	248.00	156.00	92.40	51.50	45.60	50.00	62.30	113.00	145.00	132.95
2508B1	38.60	87.20	95.00	139.00	125.00	78.70	46.70	26.00	23.00	25.30	31.50	57.10	73.30	67.13
2508C1	34.90	78.90	85.90	126.00	113.00	71.20	42.20	23.50	20.80	22.90	28.50	51.70	66.30	60.74
2508D1	138.00	312.00	339.00	497.00	447.00	282.00	167.00	93.00	82.40	90.40	113.00	204.00	262.00	240.07
2508E2	60.20	136.00	148.00	217.00	195.00	123.00	72.80	40.60	35.90	39.40	49.10	89.10	114.00	104.70
2508ZZ	1.20	2.70	3.00	4.30	3.90	2.40	1.50	0.80	0.70	0.80	1.00	1.80	2.30	2.09

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 138.00
SUM OF SUB-DRAINAGE AREAS = 211.30

TOTAL FLOW IN = 4423.57
TOTAL FLOW OUT = 2888.80

MEAN MONTHLY FLOWS AND DAILY FLOWS

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
2508A1	9	72	130.00	9	127.00				
	10	72	105.00	6	61.70				
	11	72	365.00	4	178.00				
	12	72	422.00	8	824.00				
	1	73	268.00	11	196.00				
	2	73	306.00	9	350.00				
	3	73	204.00	3	180.00	20	204.00		
	4	73	260.00	7	371.00	19	166.00		
	5	73	214.00						
	5	73	214.00	14	275.00				
	6	73	85.00						
	7	73	193.00	23	115.00				
	8	73	82.10						
2508B1	9	72	66.00	9	64.10				
	10	72	53.20	6	31.20				
	11	72	184.00	4	89.90				
	12	72	213.00	8	416.00				
	1	73	135.00	11	99.20				
	2	73	155.00						
	3	73	103.00	3	91.10	20	103.00		
	4	73	131.00	7	187.00				
	5	73	110.00						
	5	73	110.00	14	139.00				
	6	73	43.00						
	7	73	97.20	23	57.90				
	8	73	41.40						

TRIBUTARY FLOW INFORMATION FOR MASSACHUSETTS 11/26/74

LAKE CODE 250A MATFIELD RIVER IMPOUNDMENT

MEAN MONTHLY FLOWS AND DAILY FLOWS

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
250AC1	9	72	59.80	9	57.90				
	10	72	48.20	6	28.20				
	11	72	167.00	4	91.30				
	12	72	193.00	8	376.00				
	1	73	122.00	11	89.70				
	2	73	140.00						
	3	73	93.40	3	82.40	20	93.20		
	4	73	119.00	7	169.00				
	5	73	99.70						
	5	73	99.70	14	126.00				
	6	73	38.80						
	7	73	87.90	23	52.40				
	8	73	37.40						
250AD1	9	72	236.00	9	224.00				
	10	72	191.00	6	112.00				
	11	72	659.00	4	322.00				
	12	72	762.00	8	1488.00				
	1	73	484.00	11	355.00				
	2	73	553.00						
	3	73	369.00	3	326.00	20	368.00		
	4	73	449.00	7	669.00	19	299.00		
	5	73	345.00	14	497.00				
	6	73	154.00						
	7	73	348.00	23	207.00				
	8	73	148.00						
250AF2	9	72	103.00	9	99.90				
	10	72	83.00	6	48.60				
	11	72	288.00	4	140.00				
	12	72	332.00	8	649.00				
	1	73	211.00	11	155.00				
	2	73	241.00						
	3	73	161.00	3	142.00	20	161.00		
	4	73	205.00	7	292.00	19	131.00		
	5	73	172.00	14	217.00				
	6	73	67.00						
	7	73	152.00	23	90.30				
	8	73	64.60						
250AZ2	9	72	2.10						
	10	72	1.70						
	11	72	5.80						
	12	72	6.70						
	1	73	4.20						
	2	73	4.90						
	3	73	3.20						
	4	73	4.10						
	5	73	3.40						
	6	73	1.40						
	7	73	3.00						
	8	73	1.30						

APPENDIX B

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 74/11/26

250801
41 59 43.0 070 56 32.0
MATTFIELD IMPOUNDMENT
25 MASSACHUSETTS

11EPALES
3

2111202
0005 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	00665 PHOS-TOT MG/L P	00666 PHOS-DIS MG/L P
72/06/04	14 25 0000		21.3	1.6	26	260	6.60	27	0.320	4.100	0.760	0.600
72/08/01	15 00 0000				18	380	6.40	37	0.500	6.000	1.090	0.760
	15 00 0003		21.7	3.0		265	6.50	38	0.510	6.000	1.140	0.800
72/10/08	16 40 0000		16.6	2.3	6	200	6.60	10K	0.440	4.860	1.080	0.750

DATE FROM TO	TIME OF DAY	DEPTH FEET	32217 CHLRPHYL A UG/L
72/06/04	14 25 0000		2.1J
72/08/01	15 00 0000		5.0J
72/10/08	16 40 0000		1.3J

K VALUE KNOWN TO BE LESS THAN INDICATED

J VALUE KNOWN TO BE IN ERROR

STORET RETRIEVAL DATE 74/11/26

250802
41 59 54.0 070 56 58.0
MATTFIELD IMPOUNDMENT
25 MASSACHUSETTS

11FPALES 2111202
3 0005 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	00665 PHOS-TOT MG/L P	00666 PHOS-DIS MG/L P
72/06/04	14 35	0000	22.7	5.2	20	140	6.30	10	0.140	0.320	0.200	0.108
72/08/01	15 20	0000			12	160	6.10	10K	0.270	0.590	0.270	0.167
	15 20	0003	22.2	3.2		155	6.10	10K	0.260	0.540	0.310	0.132
72/10/08	16 25	0000	16.6	6.0	6	150	6.35	10K	0.350	0.420	0.203	0.108

DATE FROM TO	TIME OF DAY	DEPTH FEET	32217 CHLRPHYL A UG/L
72/06/04	14 35	0000	1.6J
72/08/01	15 20	0000	2.4J
72/10/08	16 25	0000	1.3J

K VALUE KNOWN TO BE LESS THAN INDICATED

J VALUE KNOWN TO BE IN ERROR

APPENDIX C

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 74/11/26

2508A1 LS2508A1
42 00 30.0 070 56 30.0
MATFIELD RIVER
25 705 WHITMAN
I/MATFIELD RIVER IMP.
POND ST BRDG SE OF ELMWOOD
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/09	10 50		0.332	3.850	0.072	0.009	0.430
72/11/04	15 30		0.460	4.300	0.430	0.195	1.470
72/12/08	13 45		0.520	2.310	0.380	0.084	0.154
73/01/11	14 15		0.830	3.700	2.200	0.705	1.250
73/02/09	14 30		0.670	2.800	1.100	0.440	0.660
73/03/03	15 55		0.650	9.850	2.750	1.000	1.250
73/03/20	12 10		0.400	2.730	1.800	0.630	0.820
73/04/07	13 30		0.378	4.100	0.890	0.300	0.440
73/04/19	14 30		0.320	4.900	2.600	0.930	1.200
73/07/23	14 25		0.550	5.400	2.800	0.770	1.150

STORET RETRIEVAL DATE 74/11/26

250881 LS250881
42 01 30.0 070 58 00.0
SALISBURY PLAIN RIVER
25 7.5 WHITMAN
T/MATFIELD RIVER IMP.
SPRING ST BRDG BELOW BROCKTON STP
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/09	10 10		0.530	6.300	3.500	1.260	1.920
72/10/06			0.440	7.000	1.100	0.400	1.180
72/11/04	16 00		0.460	4.900	0.525	0.098	0.770
73/01/11	13 30		1.060	4.375	2.543	0.380	0.675
73/03/03	13 55		0.850	7.350		1.100	1.300
73/03/20	15 00		0.680	3.700	2.400	0.510	0.690
73/04/07	14 40		0.590	2.200	1.020	0.190	0.310
73/05/14	11 10		0.480	4.200	1.470	0.225	0.375
73/07/23	11 10		0.465	5.400	3.435	0.800	1.300

STORET RETRIEVAL DATE 74/11/26

250AC1 LS250AC1
42 01 30.0 070 57 00.0
SATUCKET RIVER
25 7.5 WHITMAN
T/MATFIELD RIVER IMP.
ST HWY 106 BRDG
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/09			0.117	1.200	0.370		
72/10/06			0.470	1.000	0.220	0.037	0.115
72/11/04	14 45		0.231	0.960	0.154	0.036	0.084
72/12/08	13 30		0.330	2.300	0.096	0.023	0.044
73/03/03	13 20		0.470	5.100	0.154	0.024	0.030
73/03/20	11 30		0.198	2.900	0.075	0.011	0.060
73/04/07	14 06		0.121	1.100	0.045	0.016	0.032
73/05/14	11 45		0.075	2.300	0.100	0.044	0.075
73/07/23	15 00		0.252	0.960	0.150		

STOPET RETRIEVAL DATE 74/11/26

2508D1 LS2509D1
42 59 30.0 071 56 30.0
TAUNTON RIVER
25 7.5 BRIDGEWATER
O/MATFIELD RIVER IMP.
ST HWY 104 BRDG ,MILL ST.
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/09	12 05		0.255	4.050	2.300		0.300
73/01/11	13 40		0.720	2.520	1.000	0.200	0.280
73/03/03	11 50		0.590	5.300	1.500	0.430	0.525
73/03/20	13 45		0.370	2.300	0.930	0.140	0.230
73/04/07	12 10		0.231	1.900	0.460	0.154	0.230
73/04/19	11 00		0.240	3.570	1.470	0.440	0.560
73/05/14	14 35		0.160	4.800	0.720	0.180	0.270
73/07/23	12 50		0.160	4.700	1.600	0.110	0.550

STORET RETRIEVAL DATE 74/11/26

2508E1 LS2508E1
42 00 00.0 071 59 00.0
TOWN RIVER
25 705 BRIDGEWATER
T/MATFIELD RIVER IMP.
OAK ST BRDG ABOVE BRIDGEWATER STP
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/09	09 40		0.110	1.200	0.059	0.010	0.095
72/10/06			0.422	1.100	0.270	0.034	0.100
72/11/04	17 15		0.231	0.920	0.210	0.034	0.078
72/12/08	12 00		0.294	2.730	0.126	0.018	0.040
73/01/11	12 05		0.609	0.880	0.090	0.017	0.035
73/04/07	15 20		0.096	1.900	0.130	0.025	0.040
73/04/19	14 45		0.120	2.100	0.085	0.024	0.045
73/05/14	10 25		0.050	4.770	0.154	0.040	0.075
73/07/23	11 45		0.198	2.360	0.410	0.150	0.170

STORET RETRIEVAL DATE 74/11/26

2508E2 LS250AE2
42 00 00.0 071 57 30.0
TOWN RIVER
25 7.5 BRIDGEWATER
T/MATFIELD RIVER IMP.
HAYWARD ST BRDG BELO BRIDGEWATER STP
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/09	11	50	0.130	1.650	0.231	0.130	0.220
72/10/06			0.190K	1.850	0.880	0.189	0.380
72/11/04	14	15	0.320	1.260	0.850	0.080	0.128
73/01/11	12	30	0.640	2.500	0.252	0.033	0.065
73/03/03	15	00	0.500	4.200	0.240	0.044	0.065
73/03/20	12	35	0.315	1.760	0.100	0.032	0.065
73/04/07	11	35	0.120	1.100	0.069	0.026	0.045
73/04/19	11	45	0.160	2.500	0.215	0.086	0.160
73/05/14	13	30	0.066	3.500	0.315	0.072	0.125
73/07/23	13	55	0.310	2.310	0.360	0.132	0.240

27

STORET RETRIEVAL DATE 74/11/26

2508F1 LS2508F1
42 00 00.0 071 57 30.0
SOUTH BROOK
25 7.5 BRIDGEWATER
T/MATFIELD RIVER IMP.
HAYWARD ST BRDG
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/09	11 40		0.320	0.650	0.270	0.047	0.139
72/10/06			0.094	1.250	0.126	0.005K	0.063
72/11/04	13 30		0.339	1.600	0.194	0.034	0.082
73/01/11	13 00		1.240	0.630	0.067	0.018	0.040
73/03/03	14 15		0.870	4.600	0.180	0.036	0.075
73/03/20	12 50		0.520	3.590	0.091	0.026	0.090
73/05/14	14 05		0.280	3.450	0.130	0.048	0.110
73/07/23	13 15		1.840	3.500	0.060	0.014	0.250

K VALUE ...
LESS THAN ... [illegible]

STORET RETRIEVAL DATE 74/11/27

250850 TF250850 P002300
42 00 00.0 071 58 30.0
BRIDGEWATER
25 7.5 BRIDGEWATER
T/MATFIELD RIVER IMP.
TOWN RIVER
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
72/12/01	10 00								
CP(T)-			0.360	26.000	11.000	3.600	5.100	0.500	0.400
72/12/01	14 00								
73/01/09	09 30								
CP(T)-			0.790	19.900	5.400	3.175		0.350	0.400
73/01/09	14 30								
73/01/31	10 00								
CP(T)-			0.740	33.000	14.500	4.650	6.100	0.400	0.300
73/01/31	14 00								
73/02/28	09 00								
CP(T)-			1.400	31.500	12.000	3.000	6.300	0.400	0.350
73/02/28	14 00								
73/05/02	11 00								
CP(T)-			1.075	30.000	14.000	4.650	8.300	0.350	0.350
73/05/02	15 00								
73/05/31	09 45								
CP(T)-			0.270	15.000	10.500	4.500	6.300	0.400	0.600
73/05/31	14 45								
73/07/31	09 30								
CP(T)-			0.260	18.000	7.000	1.150	4.400	0.350	0.612
73/07/31	14 45								
73/10/01	09 00								
CP(T)-			0.510	29.400	19.000	7.300	8.900	0.600	0.600
73/10/01	15 00								
73/10/31	09 30								
CP(T)-			0.240	27.000	12.000	4.400	7.200	0.585	0.550
73/10/31	14 30								
73/12/06	09 00								
CP(T)-			0.310	34.000	17.000	7.300	8.700	0.544	0.540
73/12/06	15 00								
74/04/01	10 00								
CP(T)-			1.000	13.000	9.800	4.300	22.000	0.627	0.650
74/04/01	14 00								
74/04/30	09 30								
CP(T)-			0.280	27.000	3.900	6.500	9.000	2.400	0.632
74/04/30	14 30								

STORET RETRIEVAL DATE 74/11/27

250850 TF250850 P002300
42 00 00.0 071 58 30.0
BRIDGEWATER
25 7.5 BRIDGEWATER
T/MATFIELD RIVER IMP.
TOWN RIVER
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/07/01 09 00 CP(T)- 74/07/01 15 00			1.680	24.000	11.500	6.600	8.500	0.376	0.445

STORET RETRIEVAL DATE 74/11/27

250851 AS250851 P052000
42 01 30.0 071 01 00.0
HROCTON
25 7.5 WHITMAN
T/MATFIELD RIVER IMP.
SALISBURY PLAIN RIVER
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
72/11/27	08 00								
CP(T)-			0.120	12.600	4.300	2.315	3.100	18.200	9.700
72/11/28	06 00								
72/12/27	00 00								
CP(T)-			0.126	19.000	4.100	1.800	2.100	19.100	20.000
72/12/28	24 00								
73/01/31	08 00								
CP(T)-			0.058	14.000	7.850	1.775	2.800	14.900	15.200
73/02/01	06 00								
73/02/28	08 00								
CP(T)-			0.050	17.000	8.750	2.900	4.000	12.500	15.300
73/03/01	06 00								
73/03/29	08 00								
CP(T)-			0.058	24.000	9.900	3.200	5.000	11.600	12.400
73/03/30	06 00								
73/05/07	08 00								
CP(T)-			0.145	27.000	10.600	4.300	6.750	12.200	14.300
73/05/08	06 00								
73/05/31	08 00								
CP(T)-			0.069	19.900	10.000	3.390	5.000	11.500	12.800
73/06/01	06 00								
73/07/01	08 00								
CP(T)-			0.190	15.400	4.900	1.640	3.400	14.600	9.800
73/07/02	06 00								
73/07/31	08 00								
CP(T)-			0.110	22.000	8.300	2.600	5.800	10.400	11.800
73/08/01	06 00								
73/09/03	08 00								
CP(T)-				12.000		3.700	4.700	8.400	9.500
73/09/03	16 00								
73/09/30	08 00								
CP(T)-			0.070	27.000	9.900	6.900	8.500	9.000	9.300
73/09/30	14 00								
73/10/31	08 00								
CP(T)-			0.100	29.000	10.400	4.600	7.300	9.500	8.600
73/11/01	06 00								

STORET RETRIEVAL DATE 74/11/27

250851 AS250851 P052000
42 01 30.0 071 01 00.0
BROCTON
25 7.5 WHITMAN
T/MATFIELD RIVER IMP.
SALISBURY PLAIN RIVER
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/12/02	08	00							
CP(T)-			0.840	18.500	9.600	3.570	4.400	9.180	8.850
73/12/03	06	00							